

What is claimed is:

1. An insulation blanket-packaging machine, comprising:

an insulation blanket loading station for successively receiving insulation blankets; the insulation blankets each having a length and a width that define major surfaces of the insulation blanket and a thickness; the insulation blankets each being compressible;

an insulation blanket transfer station for successively receiving insulation blankets from the insulation blanket loading station and transferring the insulation blankets from the insulation blanket loading station to an insulation blanket compression station;

vertical insulation blanket moving means for successively moving groupings of one or more insulation blankets at a time in a generally vertical direction from the insulation blanket loading station through the insulation blanket transfer station into the insulation blanket compression station;

the insulation blanket compression station comprising upper and lower compression conveyors for successively receiving there between the groupings of one or more insulation blankets moved from the insulation blanket loading station through the insulation blanket transfer station into the insulation blanket compression station by the vertical insulation blanket moving means; the upper and lower compression conveyors being movable relative to each other for successively compressing each grouping of one or more insulation blankets located intermediate the upper and lower compression conveyors to successively form groupings of one or more compressed insulation blankets; the upper and lower compression conveyors being operable to successively move each grouping of one or more compressed insulation blankets from the insulation blanket compression station into an insulation blanket packaging station; and

the insulation blanket packaging station comprising means for successively enveloping each grouping of one or more compressed insulation blankets fed from the insulation blanket compression station into the insulation blanket packaging station within sheet material to successively form packages of each grouping of one or more compressed insulation blankets fed from the insulation blanket compression station into the insulation blanket packaging station.

2. The insulation blanket-packaging machine according to claim 1, wherein:

the insulation blanket loading station is for receiving insulation blankets in the form of unfolded or single-fold insulation batts;

the insulation blanket transfer station and the vertical insulation blanket moving means are for moving each grouping of one or more unfolded or single-fold insulation batts from the insulation blanket loading station into the insulation blanket compression station with the major surfaces of the one or more unfolded or single-fold batts in each grouping oriented to lie in planes parallel to planes of compressing surfaces of the compression conveyers of the compression station; and

the compressing conveyors are for compressing the one or more unfolded or single-fold batts in each grouping in a direction perpendicular to the thicknesses of the one or more unfolded or single-fold batts in each grouping to form each grouping of one or more unfolded or single-fold insulation batts into a grouping of one or more compressed unfolded or single-fold insulation batts.

3. The insulation blanket-packaging machine according to claim 1, wherein:

the insulation blanket loading station is for receiving insulation blankets in groupings of one or more spiral wound rolls of insulation blanket having a generally round shape;

the insulation blanket transfer station and the vertical insulation blanket moving means are for moving each grouping of one or more spiral wound rolls of insulation blanket from the insulation blanket loading station into the insulation blanket compression station with central axes of the one or more spiral wound rolls of insulation blanket in each grouping being oriented to lie in planes parallel to planes of compressing surfaces of the compression conveyers of the compression station; and

the compressing conveyors are for compressing the one or more spiral wound rolls of insulation blanket in each grouping in a direction perpendicular to the central axes of the one or more spiral wound rolls of insulation blanket in each grouping to form each grouping of one or more spiral wound rolls of insulation blanket into a grouping of one or more compressed spiral wound rolls of insulation blanket having a generally flat oval shape.

4. A method for packaging insulation blanket in an insulation blanket-packaging machine, comprising:

successively feeding insulation blankets into an insulation blanket loading station of the insulation blanket-packaging machine; the insulation blankets each having a length and a width that define major surfaces of the insulation blanket and a thickness; the insulation blankets each being compressible;

successively moving groupings of one or more insulation blankets in a generally vertical direction from the insulation blanket loading station through an insulation blanket transfer station into an insulation blanket compression station;

successively positioning each grouping of one or more insulation blankets moved from the insulation blanket loading station into the insulation blanket compression station between upper and lower compression conveyors in the compression station; moving the upper and lower compression conveyors relative to each other for successively compressing each grouping of one or more insulation blankets positioned intermediate the upper and lower compression conveyors to successively form groupings of one or more compressed insulation blankets; operating the upper and lower compression conveyors to successively move each grouping of one or more compressed insulation blankets from the insulation blanket compression station into an insulation blanket-packaging station; and

successively enveloping each grouping of one or more compressed insulation blankets fed from the insulation blanket compression station into the insulation blanket-packaging station within sheet material to successively form packages of each grouping of one or more compressed insulation blankets fed from the insulation blanket compression station into the insulation blanket-packaging station.

5. The method for packaging insulation blanket in an insulation blanket-packaging machine according to claim 4, wherein:

the insulation blankets are fed into the insulation blanket loading station in the form of unfolded or single-fold insulation batts;

the groupings of one or more insulation blankets are groupings of one or more unfolded or single-fold insulation batts; each grouping of one or more unfolded or single-fold insulation batts are successively moved from the insulation blanket loading station through the insulation blanket transfer station and into the insulation blanket compression station with the major surfaces of the one or more unfolded or single-fold batts in each grouping oriented to lie in planes parallel to planes of compressing surfaces of the compression conveyors of the compression station; and

the compressing conveyors compress the one or more unfolded or single-fold batts in each grouping in a direction perpendicular to the thicknesses of the one or

more unfolded or single-fold batts in each grouping to form each grouping of one or more unfolded or single-fold insulation batts into a grouping of one or more compressed unfolded or single-fold insulation batts.

6. The method for packaging insulation blanket in an insulation blanket-packaging machine according to claim 4, wherein:

the insulation blankets are fed into insulation blanket loading station in groupings of one or more spiral wound rolls of insulation blanket having a generally round shape;

each grouping of one or more spiral wound rolls of insulation blanket is moved from the insulation blanket loading station through the insulation blanket transfer station and into the insulation blanket compression station with central axes of the one or more spiral wound rolls of insulation blanket in each grouping being oriented to lie in planes parallel to planes of compressing surfaces of the compression conveyers of the compression station; and

the compressing conveyors compress the one or more spiral wound rolls of insulation blanket in each grouping in a direction perpendicular to the central axes of the one or more spiral wound rolls of insulation blanket in each grouping to form each grouping of one or more spiral wound rolls of insulation blanket into a grouping of one or more compressed spiral wound rolls of insulation blanket having a generally flat oval shape.

7. An insulation blanket-packaging machine, comprising:

a batt loading station for receiving batts; the batts each having a length and a width that define major surfaces of the batt and a thickness; the batts each being compressible in a direction generally perpendicular to the thickness of the batt;

a transfer and batt-stacking station for receiving batts from the batt loading station;

vertical batt moving means for successively moving batts in a generally vertical direction from the batt loading station into the transfer and batt-stacking station;

means in the transfer and batt-stacking station for successively forming batt stacks of vertically stacked batts from batts successively moved into the transfer and batt-stacking station from the batt loading station;

a batt stack compression station for successively receiving batt stacks from the transfer and batt-stacking station;

vertical batt stack moving means for successively moving batt stacks in a generally vertical direction from the transfer and batt-stacking station into the batt compression station;

the batt compression station comprising upper and lower compression conveyors for successively receiving there between batt stacks fed from the transfer and batt-stacking station into the batt compression station; the upper and lower compression conveyors being movable relative to each other for successively compressing batt stacks located intermediate the upper and lower compression conveyors in a direction perpendicular to the thicknesses of the batts in the batt stacks to successively form compressed batt stacks; the upper and lower compression conveyors being operable to successively move the compressed batt stacks from the batt compression station into a batt packaging station; and

the batt packaging station comprising means for successively enveloping compressed batt stacks successively fed from the batt compression station into the batt packaging station within sheet material to successively form packages of the compressed batt stacks fed from the batt compression station into the batt packaging station.

8. The insulation blanket-packaging machine according to claim 7, including:

means for successively feeding batts into the batt loading station; and
means for successively removing packages from the batt packaging station.

9. The insulation blanket-packaging machine according to claim 7, wherein:

with respect to each batt stack formed in the transfer and batt-stacking station, the vertical batt stack moving means also moves a single batt from the batt loading station into the transfer and batt-stacking station to complete the formation of the batt stack in the transfer and batt-stacking station prior to vertically moving the batt stack thus formed from the transfer and batt-stacking station into the batt compression station.

10. The insulation blanket-packaging machine according to claim 9, wherein:

the vertical batt moving means successively moves batts from the batt loading station into the transfer and batt-stacking station until a first selected number

of batts, that is one less than a second selected number of batts to be formed into the batt stack in the transfer and batt-stacking station, has been moved into the transfer and batt-stacking station; the vertical batt moving means is deactivated once the first selected number of batts has been moved into the transfer and batt-stacking station; the vertical batt stack moving means is activated to move the single batt from the batt loading station into the transfer and batt-stacking station to complete the formation of the batt stack in the transfer and batt-stacking station and move the batt stack thus formed from the transfer and batt-stacking station into the batt compression station when the vertical batt moving means is deactivated; and the vertical batt moving means is reactivated to again successively move batts from the batt loading station into the transfer and batt-stacking station once the vertical batt moving means has moved the single batt into the transfer and batt-stacking station from the batt loading station to complete the formation of the batt stack in the transfer and batt-stacking station.

11. The insulation blanket-packaging machine according to claim 7, wherein:

the vertical batt moving means for successively moving batts in a generally vertical direction from the batt loading station into the transfer and batt-stacking station elevates the batts;

the vertical batt stack moving means for moving the successively formed batt stacks from the transfer and batt-stacking station into the batt compression station elevates the batt stacks; and

the compression conveyors are operative to move the compressed batt stacks in a generally horizontal direction into the batt packaging station.

12. The insulation blanket-packaging machine according to claim 7, wherein:

the vertical batt moving means for successively moving batts in a generally vertical direction from the batt loading station into the transfer and batt-stacking station is a reciprocating launch frame that reciprocates between a retracted position for permitting batts to be successively fed into the batt loading station and an extended position for successively feeding the batts from the batt loading station into a batt-stacking chamber of the transfer and batt-stacking station.

13. The insulation blanket-packaging machine according to claim 7, wherein:

the vertical batt moving means for successively moving batts in a generally vertical direction from the batt loading station into the transfer and batt-stacking station is a reciprocating launch frame that reciprocates between a retracted position for permitting batts to be successively fed into the batt loading station and an extended position for successively elevating and feeding the batts from the batt loading station into a batt-stacking chamber of the transfer and batt-stacking station; and

the batt-stacking chamber of the transfer and batt-stacking station includes means for retaining the batts successively fed into the batt-stacking chamber of the transfer batt-stacking station stacked and elevated above the batt loading station until the vertical batt stack moving means for vertically moving the successively formed batt stacks from the transfer and batt-stacking station into the batt compression station moves the successively formed batt stacks into the batt compression station.

14. The insulation blanket-packaging machine according to claim 7, wherein:

the vertical batt moving means for successively moving batts in a generally vertical direction from the batt loading station into the transfer and batt-stacking station is a reciprocating launch frame that reciprocates between a retracted position for permitting the batts to be successively fed into the batt loading station and an extended position for successively elevating and feeding the batts from the batt loading station into a batt-stacking chamber of the transfer and batt-stacking station; and

the batt-stacking chamber of the transfer and batt-stacking station includes means for retaining the batts successively fed into the batt-stacking chamber of the transfer and batt-stacking station stacked and elevated above the batt loading station until the vertical batt stack moving means for vertically moving the successively formed batt stacks from the transfer and batt-stacking station into the batt compression station moves the successively formed batt stacks into the batt compression station; and

the vertical batt stack moving means for vertically moving the successively formed batt stacks from the transfer and batt-stacking station into the batt compression station comprises reciprocating batt stack supporting and elevating means that reciprocates from a retracted position for permitting the batts to be

successively fed from the batt loading station into the batt-stacking chamber of the transfer and batt-stacking station by the vertical batt moving means during the formation of each batt stack in the transfer and batt-stacking station to an extended position for moving a single batt from the batt loading station into the transfer and batt-stacking station to complete the formation of each batt stack in the transfer and batt-stacking station and for supporting the batt stack thus formed while the batt stack is elevated within the batt-stacking chamber from the transfer and batt-stacking station into the batt compression station and back to the retracted position while in the batt compression station with the reciprocating batt stack supporting and elevating means being retracted as the lower compression conveyor of the batt compression station advances to transfer the batt stack from the reciprocating batt stack support and elevating means to the lower compression conveyor for compression in a compression chamber of the batt compression station.

15. The insulation blanket-packaging machine according to claim 7, wherein:

the vertical batt moving means for successively moving batts in a generally vertical direction from the batt loading station into the transfer and batt-stacking station is a reciprocating launch frame that reciprocates between a retracted position for permitting the batts to be successively fed into the batt loading station and an extended position for successively elevating and feeding the batts from the batt loading station into a batt-stacking chamber of the transfer and batt-stacking station; and

the batt-stacking chamber of the transfer and batt-stacking station includes means for retaining the batts successively fed into the batt-stacking chamber of the transfer and batt-stacking station stacked and elevated above the batt loading station until the vertical batt stack moving means for vertically moving the successively formed batt stacks from the transfer and batt-stacking station into the batt compression station moves the successively formed batt stacks into the batt compression station; and

the vertical batt stack moving means for vertically moving the successively formed batt stacks from the transfer and batt-stacking station into the batt compression station comprises reciprocating batt stack supporting and elevating means that reciprocates from a retracted position for permitting the batts to be successively fed from the batt loading station into the batt-stacking chamber of the transfer and batt-stacking station by the vertical batt moving means during the

formation of each batt stack in the transfer and batt-stacking station to an extended position for moving a single batt from the batt loading station into the transfer and batt-stacking station to complete the formation of each batt stack in the transfer and batt-stacking station and for supporting the batt stack thus formed while the batt stack is elevated within the batt-stacking chamber from the transfer and batt-stacking station into the batt compression station and back to the retracted position while in the batt compression station with the reciprocating batt stack supporting and elevating means being retracted as the lower compression conveyor of the batt compression station advances to transfer the batt stack from the reciprocating batt stack support and elevating means to the lower compression conveyor for compression in a compression chamber of the batt compression station; and

the batt packaging station includes a means for feeding a first sheet of packaging material over the compressed batt stacks successively fed from the batt compression station into the batt packaging station; a means for feeding a second sheet of packaging material beneath the compressed batt stacks successively fed from the batt compression station into the batt packaging station; and means for sealing lateral edges of the sheets of packaging material together, for transversely sealing portions of the sheets of packaging material together intermediate the successive compressed batt stacks fed from the batt compression station, and for transversely severing the sheets of packaging material intermediate the successive compressed batt stacks fed from the batt compression station to successively encapsulate the compressed batt stacks to form the packages.

16. The insulation blanket-packaging machine according to claim 15, wherein:

the batt packaging station includes means for successively depositing banners intermediate one the sheets of packaging material and the compressed batt stacks successively fed from the batt compression station; and the packaging material is sufficiently clear to view the banner through the packaging material.

17. The insulation blanket-packaging machine according to claim 15, wherein:

the means for retaining the batts successively fed into the batt-stacking chamber of the transfer and batt-stacking station stacked and elevated above the loading station until the means for vertically moving the successively formed batt stacks from the transfer and batt-stacking station into the batt compression station,

moves the successively formed batt stacks into the batt compression station, comprises a series of opposed retaining mechanisms adjacent a bottom end of the batt-stacking chamber that each include a pivotally mounted support element that pivots between an extended position where an upper surface of the support element projects out into the batt-stacking chamber to engage an underside of and support a batt within the batt-stacking chamber and a retracted position where a batt can be fed into the batt-stacking chamber by the launch frame of the batt loading station; the support element being moved to the retracted position by a batt being fed into the batt-stacking chamber from the batt loading station by the launch frame of the batt loading station; and the retaining mechanism including means for urging the support element into the extended position after a batt is moved past the upper surface of the support element to place the support element in the extended batt supporting position.

18. The insulation blanket-packaging machine according to claim 7, wherein:

the batt packaging station includes a means for feeding a first sheet of packaging material over the compressed batt stacks successively fed from the batt compression station into the batt packaging station; a means for feeding a second sheet of packaging material beneath the compressed batt stacks successively fed from the batt compression station into the batt packaging station; and means for sealing lateral edges of the sheets of packaging material together, for transversely sealing portions of the sheets of packaging material together intermediate the successive compressed batt stacks fed from the batt compression station, and for transversely severing the sheets of packaging material intermediate the successive compressed batt stacks fed from the batt compression station to successively encapsulate the compressed batt stacks to form the packages.

19. The insulation blanket-packaging machine according to claim 18, wherein:

the packaging station includes means for successively depositing banners intermediate one the sheets of packaging material and the compressed batt stacks successively fed from the batt compression station; and the packaging material is sufficiently clear to view the banner through the packaging material.

20. A method of continuously packaging batts, comprising:

- providing a source of batts; the batts each having a length and a width that define major surfaces of the batt and a thickness; the batts each being compressible in a direction generally perpendicular to the thickness of the batt;
- successively feeding the batts into a batt loading station of an insulation blanket-packaging machine;
- successively moving the batts in a generally vertical direction from the batt loading station into a transfer and batt-stacking station;
- successively forming batt stacks of vertically stacked batts in the transfer and batt-stacking station from the batts fed into the transfer and batt-stacking station from the batt loading station;
- successively moving the successively formed batt stacks in a generally vertical direction from the transfer and batt-stacking station into a batt compression station;
- successively receiving the batt stacks fed from the transfer and batt-stacking station between upper and lower compression conveyors in the batt compression station;
- successively compressing the batt stacks received between the upper and lower compression conveyors in a direction perpendicular to the thicknesses of the batts in the batt stacks to successively form compressed batt stacks;
- successively moving the compressed batt stacks from the batt compression station into a batt packaging station;
- successively enveloping the compressed batt stacks fed from the batt compression station into the batt packaging station within sheet material in the batt packaging station to successively form packages of the compressed batt stacks fed into the batt packaging station from the batt compression station; and
- successively removing the packages from the packaging station.

21. The method of packaging batts according to claim 20, wherein:

- the method of packaging batts is a continuous operation with a continuous: feeding of batts into the batt loading station;
- movement of the batts previously fed into the batt loading station from the batt loading station into the transfer and batt-stacking station;
- formation of one of the successively formed batt stacks in the transfer and batt-stacking station from the batts moved from the batt loading station into the transfer and batt-stacking station;

compression in the batt compression station of one of the successively formed batt stacks moved from the transfer and batt-stacking station into the batt compression station;

envelopment within the sheet material in the batt packaging station of one of the successively formed compressed batt stacks fed from the batt compression station into the batt packaging station to form a package; and

discharge of one of the successively formed packages from the batt packaging station.

22. The method of packaging batts according to claim 20, wherein:

the batts are elevated in the generally vertical direction from the batt loading station into the transfer and batt-stacking station;

the batt stacks are elevated in the generally vertical direction from the transfer and batt-stacking station into the batt compression station; and

the compressed batt stacks are moved in a generally horizontal direction from the batt compression station into the batt packaging station by the compression conveyors.

23. The method of packaging batts according to claim 20, wherein:

each of the packages formed in the batt packaging station is formed by feeding a first sheet of packaging material over the compressed batt stack in the batt packaging station, feeding a second sheet of packaging material beneath the compressed batt stack in the batt packaging station, sealing lateral edges of the sheets of packaging material together, sealing portions of the sheets of packaging material together intermediate the compressed batt stack in the package forming station and a preceding compressed batt stack enveloped within the sheets of packaging material and discharged from the batt packaging station to complete the encapsulation of the preceding compressed batt stack within the sheets of packaging material, and transversely severing the sheets of packaging material intermediate the compressed batt stack in the batt packaging station and the preceding compressed batt stack enveloped within the sheets of packaging material and discharged from the batt packaging station.

24. The method of packaging batts according to claim 23, including:

depositing a banner intermediate the first sheet of packaging material and the compressed batt stack being packaged in the batt packaging station; and

using a packaging material for first sheet of packaging material that is sufficiently clear to view the banner through the packaging material.